

## ABSTRACT

*The healthy indoor CO<sub>2</sub> gas concentration is recommended maximum around 1000 ppm with maximum 8 hours exposure. High indoor CO<sub>2</sub> concentration affects the health of individuals who are active within such environments. Poor indoor air quality can trigger Sick Building Syndrome (SBS), showing drowsiness, headaches, difficulty concentrating, and hypersensitivity symptoms. Air purifier can be a solution for improving indoor air quality. However, existing commercial air purifiers have not been effectively reducing CO<sub>2</sub> concentrations, and do not display the effective pollutant reduction data. To address these issues, a prototype of a CO<sub>2</sub>-adsorbing air purifier is developed, with CO<sub>2</sub> adsorptive filter using a Zeolite Molecular Sieve 13X HP 0.4-0.8 Oxygen Concentrator filter. This prototype is equipped with a ThingSpeak platform data delivery, a Micro SD Card data storage, and LCD display system for monitoring the CO<sub>2</sub> gas reduction. The air purifier prototype dimension is 13.5 x 13.5 x 35.5 cm, with a calculated Clean Air Delivery Rate (CADR) of 2.6 m<sup>3</sup> /h for a 3 x 3 m room. The Zeolite filter's ability to reduce CO<sub>2</sub> concentration was tested in a chamber with CO<sub>2</sub> concentration around 3000 -5000 ppm and in a 3 x 3 m room with ambient CO<sub>2</sub> concentration. The Zeolite was able to reduce CO<sub>2</sub> concentration from 15% up to 40% in the chamber. However, the CO<sub>2</sub>reduction was only 15 % at ambient concentration. The data loss percentage in Micro SD card data storage systems is approximately 5.9 – 6.5%, whereas when transmitted through the Thingspeak platform, the data loss reaches 7 – 9.6%. In addition, the potential application of MIL-101 (Cr) and MIL-101 (Cr) as CO<sub>2</sub> sensors were also explored. The initial test showed that MIL-101 (Cr) and MIL-101 (Cr) deposited on top Al<sub>2</sub>O<sub>3</sub> electrical properties were sensitive to CO<sub>2</sub> changes from 600 – 5000 ppm. However, the current was only in the order of nA and required further signal conditioning.*

*Keywords: Air Purifier, LCD Display, Zeolite Filter, MOF, Sick Building Syndrome (SBS)*